EAST WEST UNIVERSITY
Department of Computer Science and Engineering
B.Sc. in Computer Science and Engineering Program
Final, Summer 2021

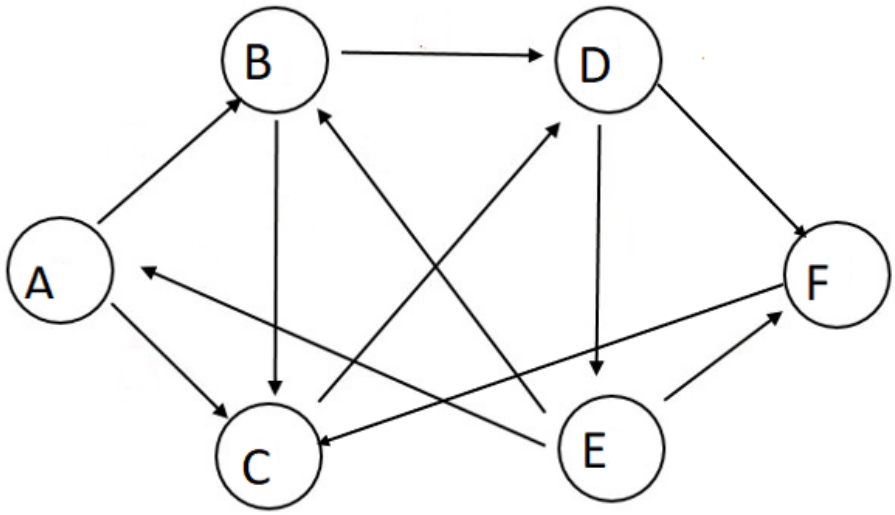
Course: CSE246 (Algorithms), Section - 1
Instructor: Taskeed Jabid
Full Marks: 20
Time: 1 Hour and 15 Minutes

Note: There are Five questions, answer ALL of them.
In some question, you need to choose some input data. I expect that no input data set will be same with any other script.

---

1. Suppose in a weighted graph weight of all edges are same. Only one edge is negative value with that same weight. As example, if weight of one edge is 10 then all edges weight is 10 and only one edge weight is -10. In this specific graph if you want to find shortest path to all nodes from a specific source, which shortest path algorithm need to applied. Write down that algorithm. If some modification ensures better performance, then write down the modified algorithm.

2. Assign weight of the edges of the following graph from the set of integers ranging from 1 to 25. Run the Dijkstra shortest path algorithm on the following graph, starting from vertex A. Specifically, fill in the following table below according the steps of the algorithm.



Iteration/Vertex	A	B	C	D	E	F
0	0/Nil	Infinity/Nil	Infinity/Nil	Infinity/Nil	Infinity/Nil	Infinity/Nil
1						
2						
3						
4						
5						

6						

3. Using the weighted graph value of question 2 (consider undirected), what will be value of MST. Draw the resultant tree if Kruskal's algorithm is applied.

4. Given the following Prim's MST pseudocode, suppose you missed or forgot to implement the highlighted statements. Can you able to MST value and/or MST tree? Explain/Justify your answer.

```
PRIM(G, w, r)
Q = ∅
for each u ∈ G.V
    u.key = ∞
    u.π = NIL
    INSERT(Q, u)
DECREASE-KEY(Q, r, 0)        // r.key = 0
while Q ≠ ∅
    u = EXTRACT-MIN(Q)
    for each v ∈ G.Adj[u]
        if v ∈ Q and w(u, v) < v.key
            v.π = u
            DECREASE-KEY(Q, v, w(u, v))
```

5. Using the weighted graph value of question 2, what will the value of D^0 and D^1 if you apply Floyd-Warshall algorithm.